

CLAIMS

That which is claimed is:

1. A method for placing an embolic coil into an aneurysm comprising the steps of:

5 providing a delivery catheter having a proximal section, a distal section and an intermediate section which is formed from a relatively flexible polymeric material, said catheter having a first lumen and a second lumen with a side opening from the second lumen at a location within the intermediate section, and said catheter having a pre-shaped retaining wire extending through said first lumen for normally forming the intermediate section into a generally U-shaped configuration;

10 inserting a straightening wire into the second lumen of the delivery catheter to cause said intermediate section of the catheter to become relatively straight;

15 introducing the delivery catheter into the vessel of a patient to generally align the side opening with the aneurysm;

20 withdrawing the straightening wire from said second lumen of said delivery catheter to cause the intermediate section of the delivery catheter to return to the U-shaped configuration at a location proximal to the aneurysm to thereby cause the side opening to move to a position adjacent to the aneurysm;

introducing an embolic coil deployment device into the delivery catheter through the second lumen and through the side opening into the aneurysm;

5 delivering the embolic coil into the aneurysm with the coil deployment device;

10 withdrawing the embolic coil deployment device from the delivery catheter;

15 again inserting the straightening wire into the second lumen of the catheter to cause said intermediate section to become relatively straight; and,

thereafter withdrawing the delivery catheter from the vessel of the patient.

2. A method for placing an embolic coil into an aneurysm comprising the steps of:

20 providing a delivery catheter having a proximal section, a distal section and an intermediate section which is formed from a relatively flexible polymeric material, said intermediate section being normally shaped in a generally bowed configuration and said catheter having a first lumen and a second lumen with a side opening at a location within the intermediate section;

inserting a straightening wire into the second lumen of the catheter to cause said intermediate section of the catheter to become relatively straight;

introducing the delivery catheter into the vessel of a patient to generally align the side opening with the aneurysm; withdrawing the straightening wire from said second lumen to cause the intermediate section of the delivery catheter to 5 return to the bowed configuration at a location proximal to the aneurysm to thereby cause the side opening to move to a position adjacent to the aneurysm;

introducing an embolic coil hydraulic deployment device into the delivery catheter through the second lumen and through 10 the side opening into the aneurysm; said coil deployment device including an elongated flexible deployment catheter having a lumen extending therethrough and having a distal section being formed of a material having a durometer which exhibits the 15 characteristic that when a fluid pressure is applied to the lumen of the deployment catheter the walls of the distal section of the catheter expand outwardly, an embolic coil being disposed in fluid-tight engagement within the lumen of the distal section of the device, and a source of pressure coupled to the proximal section of the device for applying a fluid pressure to the lumen 20 of the device;

applying a pressure with said source of pressure to the lumen of the deployment device to thereby cause the walls of the distal section of the deployment device to expand and release the embolic coil;

10 withdrawing the embolic coil deployment device from the delivery catheter;

again inserting the straightening wire into the second lumen of the catheter to cause said intermediate section to
5 become relatively straight; and,

thereafter withdrawing the delivery catheter from the vessel of the patient.

3. A method for placing a medical agent within a vessel comprising the steps of:

15 providing a delivery catheter having a proximal section, a distal section and an intermediate section which is formed from a relatively flexible polymeric material, said intermediate section being normally shaped in a generally bowed configuration; and said catheter having a first lumen and a second lumen with a side opening at a location within the intermediate section;

20 preloading the second lumen of the delivery catheter with a guidewire extending through said second lumen to thereby cause the intermediate section of the catheter to straighten;

introducing the catheter into the vessel of a patient to generally align the side opening at a preselected position within the vessel;

10 withdrawing the guidewire to thereby permit the intermediate section of the catheter to straighten; introducing a medical agent deployment device into the second lumen of the delivery catheter and through the side 5 opening to deliver the medical agent at the preselected position;

15 reinserting the guidewire into the second lumen of the delivery catheter to thereby again cause the intermediate section of the catheter to straighten; and,

20 thereafter withdrawing the delivery catheter from the vessel of the patient.

4. A method as defined in Claim 3, wherein said medical agent comprises a diagnostic agent.

5. A method as defined in Claim 3, wherein said medical agent comprises a therapeutic agent.

20 6. A method as defined in Claim 3, wherein said medical agent comprises an embolic coil.

7. A method for placing a medical agent into an aneurysm comprising the steps of:

providing a delivery catheter having a proximal section, a distal section and an intermediate section which is formed from a relatively flexible polymer material, said intermediate section being normally shaped in a generally U-shaped 5 configuration; and said catheter having a first lumen and a second lumen with a side opening at a location within the intermediate section;

inserting a straightening wire into the second lumen of the catheter to cause said intermediate section of the catheter to 10 become relatively straight;

introducing the delivery catheter into the vessel of a patient to generally align the side opening with the aneurysm;

15 withdrawing the straightening wire from said second lumen to cause the intermediate section of the delivery catheter to return to the U-shaped configuration at a location proximal to the aneurysm to thereby cause the side opening to move to a position adjacent to the aneurysm;

introducing a medical agent deployment device into the delivery catheter through the second lumen and through the side 20 opening into the aneurysm;

delivering a medical agent into the aneurysm;

25 withdrawing the medical agent deployment device from the delivery catheter;

again inserting the straightening wire into the second lumen of the catheter to cause said intermediate section to become relatively straight; and,

thereafter withdrawing the delivery catheter from the
5 vessel of the patient.

8. A method as defined in Claim 7, wherein said medical agent comprises a diagnostic agent.

10 9. A method as defined in Claim 7, wherein said medical agent comprises a therapeutic agent.

15 10. A method as defined in Claim 7, wherein said medical agent comprises an embolic coil.

11. A method for placing an embolic coil into an aneurysm comprising the steps of:

providing a delivery catheter having a proximal section, a distal section and an intermediate section which is formed from
20 a relatively flexible polymeric material, said catheter having a lumen extending therethrough with a side opening from the lumen at a location within the intermediate section; said delivery catheter being pre-shaped such that said intermediate section is in a generally U-shaped configuration;

inserting a straightening wire into the lumen of the delivery catheter to cause said intermediate section of the catheter to become relatively straight;

5 introducing the delivery catheter into the vessel of a patient to generally align the side opening with the aneurysm;

10 withdrawing the straightening wire from said lumen of said delivery catheter to cause the intermediate section of the delivery catheter to return to the U-shaped configuration at a location proximal to the aneurysm to thereby cause the side opening to move to a position adjacent to the aneurysm;

15 introducing an embolic coil deployment device into the delivery catheter through the lumen and through the side opening into the aneurysm;

20 delivering the embolic coil into the aneurysm with the coil deployment device;

withdrawing the embolic coil deployment device from the delivery catheter;

again inserting the straightening wire into the lumen of the catheter to cause said intermediate section to become relatively straight; and,

25 thereafter withdrawing the delivery catheter from the vessel of the patient.

12. A method for placing an embolic coil into an aneurysm comprising the steps of:

providing a delivery catheter having a proximal section, a distal section and an intermediate section which is formed from 5 a relatively flexible polymeric material, said catheter having a lumen extending therethrough with a side opening from the lumen at a location within the intermediate section;

pre-shaping the intermediate section of the delivery catheter into a generally U-shaped configuration;

10 inserting a straightening wire into the lumen of the delivery catheter to cause said intermediate section of the catheter to become relatively straight;

introducing the delivery catheter into the vessel of a patient to generally align the side opening with the aneurysm;

15 withdrawing the straightening wire from said lumen of said delivery catheter to cause the intermediate section of the delivery catheter to return to the U-shaped configuration at a location proximal to the aneurysm to thereby cause the side opening to move to a position adjacent to the aneurysm;

20 introducing an embolic coil deployment device into the delivery catheter through the lumen and through the side opening into the aneurysm;

delivering the embolic coil into the aneurysm with the coil deployment device;

10 withdrawing the embolic coil deployment device from the delivery catheter;

15 again inserting the straightening wire into the lumen of the catheter to cause said intermediate section to become 5 relatively straight; and,

thereafter withdrawing the delivery catheter from the vessel of the patient.

13. A method for placing an embolic coil into an aneurysm 10 comprising the steps of:

15 providing a delivery catheter having a proximal section, a distal section and an intermediate section which is formed from a relatively flexible polymeric material, said catheter having a first lumen and a second lumen with a side opening from the second lumen at a location within the intermediate section, and said catheter having a shape retaining wire extending through said first lumen;

20 pre-shaping the intermediate section of the catheter to cause the retaining wire to take the shape of a U-shaped configuration in the intermediate section of the catheter;

inserting a straightening wire into the second lumen of the delivery catheter to cause said intermediate section of the catheter to become relatively straight;

introducing the delivery catheter into the vessel of a patient to generally align the side opening with the aneurysm;

10 withdrawing the straightening wire from said second lumen of said delivery catheter to cause the intermediate section of the delivery catheter to return to the U-shaped configuration at a location proximal to the aneurysm to thereby cause the side opening to move to a position adjacent to the aneurysm;

15 introducing an embolic coil deployment device into the delivery catheter through the second lumen and through the side opening into the aneurysm;

20 delivering the embolic coil into the aneurysm with the coil deployment device;

25 withdrawing the embolic coil deployment device from the delivery catheter;

30 again inserting the straightening wire into the second lumen of the catheter to cause said intermediate section to become relatively straight; and,

35 thereafter withdrawing the delivery catheter from the vessel of the patient.